

UNDERSTANDING KNOWLEDGE ATTITUDE AND PRACTICE OF ENERGY CONSERVATION AT WORKPLACE AMONG EMPLOYEES OF THE UNIVERSITY FOR DEVELOPMENT STUDIES

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ABSTRACT

The study examined the level of awareness of energy conservation among employees of University for Development Studies (UDS); their attitudes towards energy conservation and the practices involved in energy conservation at the workplace. The study adopted both qualitative and quantitative research approaches to collect both the primary and secondary data. The purposive sampling method was used. This is a sampling technique that is based on the researcher's use of his or her special knowledge or expertise in the selection of participants for inclusion in a research. The participants for the research were selected among staff of the Central Administration of the University for Development Studies. Among those selected were 6 junior staff, 37 senior staff and 7 senior members. Data analysis was based on the qualitative and quantitative approaches. The qualitative data was analyzed non-numerically while the quantitative data was analyzed in numerical terms to give specified degree of confidence. The study revealed that energy is wasted each day due to actions and inaction of the employees. It emphasized that the principal cause of energy wasted is lack of involvement and awareness among employees. Hence, the failure to adopt participatory management strategies at the university makes it extremely difficult to change people's behaviour and attitudes towards energy conservation. In view of this setback individual interest supersedes the collective interest of the university in terms adopting energy efficient strategies and principles. The study therefore recommends that energy audit should be promoted in all the Campuses of the university and should be made mandatory and feedback provided to employees in the various offices.

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INTRODUCTION

Conservation is the first law of natural world. Inefficient use of energy results into wastage and has a negative environmental impact. The primary step towards a sustainable energy system is a thoughtful use of the existing asset. It is widely noted that energy conserved is energy created, but now the biggest challenge is how to motivate domestic consumers and employees in public offices to conserve energy or alter consumer's behaviour towards energy conservation. Energy has become an important aspect of human life. Things such as mobile phones, computers, internet, cooling systems, light bulbs and nearly everything in our life need electricity to keep functioning.

The evolution of human society has been accompanied by a search for ways and means to transform and use energy to maintain and improve livelihood to make life comfortable. With the increasing world's population, the need for energy conservation for the present generation without putting the life of the future generation in jeopardy cannot be glossed over (Samoteeva, 2000).

Energy has been recognized as an indispensable resource for the promotion of economic activities and the enhancement of human welfare. This realisation has underpinned several research works in the field of energy and the environment in order to address socio-economic issues including, poverty, income disparity, energy availability, accessibility and affordability in urban and rural areas (Bawakyillenuo and Agbelie, 2015).

Effective energy conservation and efficiency solutions will likely draw on a better understanding of the social systems and human behaviours that shape energy consumption. As Lutzenhiser (1993) points out, human behaviour significantly amplifies or dampens the effects of technology-based initiatives by playing a central role in the short and long-term initiation, maintenance, and alteration of energy flows.

Energy security has been recognized as an important element in the global development agenda over the past four decades. In recent times, many countries have felt the emerging energy crisis with heavy reliance on fossil fuels (such as oil, natural gas and coal) which account for 80% of global demand for primary energy (Gunatilake and Padmakanthi, 2008). With the dwindling energy supply, it is important that energy conservation practices are instituted as a first measure and increase adoption of energy efficient technologies as a long term measure (Mills and Schleicha, 2012).

Energy is wasted each day due to actions and inaction of the society. The principal cause is lack of awareness among societies (Wai et al, 2006). In recent times, the prices of oil and natural gas have gone beyond the means of many people in both developed and developing countries (Wai et al, 2006). He emphasized that the continuous increasing trend in oil prices will have negative ramifications such as recession, inflation and unemployment on the global economy.

In Ghana, power crises have received a lot of attention in the public discourse. There is consensus that the country is currently experiencing its fourth power crisis in recent memory. The reasons for such power crisis are not farfetched. The first power crisis in 1984 was caused by an unprecedented drought which impact was felt throughout the West African sub-region. The second and third power crisis which occurred in 1998 and 2002 respectively were attributed to low rainfall in the Volta basin. The current crisis has been subjected to much public debate and most critical observers agree that the old reason of low

water levels cannot stand the test of time any longer and has questioned the country's ability to learn from previous power crisis (Arko, 2013).

In the media, both experts and non-experts in the energy sector have extensively discussed how to halt the energy crisis in the country in order to forestall any future unpleasant occurrences. However, what is hardly mentioned is the critical issue of energy conservation by consumers such as employees in public sector organisations which has the potential to increase the energy available for distribution by the relevant agencies (Arko, 2013). It is also urged that the increases in energy prices which will not decline in the foreseeable future must be the bases for energy conservation (Wai et al, 2006). Accordingly, Wai et al, (2006) noted that energy conservation may not only reduce carbon dioxide emission but equally save expenditures on energy. It is imperative that sustained efforts are made to realize this potential.

The government has recently made its intentions clear that utility bills of Ministries, Departments and Agencies (MDAs) and other educational institutions including Senior High Schools (SHS), Colleges, Polytechnics and Universities which were hitherto paid by government will now be borne by the various institutions. A daily briefing at the Flagstaff House by a Deputy Minister of Information and Media Relations stated that the continuous payment of these utility bills have "serious implications" for other government programmes hence the decision of government (Daily Guide, 31st October, 2013). Therefore, it is clear that energy conservation has a critical role to play as a sustainable measure and that the behaviour of power consumers is important in addressing the current energy crisis. It is against this background that this study seeks to assess the knowledge, attitude and practices of energy conservation at workplace among employees of the University for Development Studies using the behavioural change approach to energy conservation.

1.1 Problem Statement

Ghana's energy crisis has deteriorated in recent times, hitting businesses hard, with authorities blaming the situation on low water levels in the Akosombo Dam and lack of gas to power the country's thermal plants. Industries are laying-off workers, domestic power consumers are complaining of destruction of household appliances, while cold store operators are grouchy over their rotten fish and meat products due to persistent erratic power supply. Higher Education Institutions are spending huge sums of money on fuel to power electrical generators to enable them process students' document and to have constant touch with the international community in terms of business.

Latest research by Data Bank, one of Ghana's leading financial providers, suggests the country is likely to lose up to \$1.4 billion by the end of the year if the situation does not improve soon. Also recent reports from the industrial and Commercial Workers Union (ICU), suggests that some workers of Coca Cola Ghana, Fan Milk, Cadbury Ghana and other companies have fallen victims to this crisis as such the companies have planned to retrench their employees due to the worsening power crisis, having a toll on industries and businesses. The path to a sustainable energy system for the future lies in two broad segments. The first is technology advancements and the second is conserving energy. With the current scenario, most energy efficiency measures yet to be implemented in Ghana involve technological interventions, but this will equally have to rely on people adjusting their energy consumption behaviour. It is in this light, that this study adopted behaviour

change theories to facilitate the conservation of energy to save money, protect office equipment from destroying and increase productivity. Hence, the overarching objectives of the study is to examine the level of awareness of energy conservation among employees; examine the attitude of employees towards energy conservation; identify the practices of energy conservation at the workplace; and recommend measures to ensure energy conservation in the University.

1.2 Conceptual and Theoretical Framework

Energy is wasted each day as a result of the actions and inactions of people. It is believed that effective behaviour interventions can reduce the wastage of energy in offices and conserve energy for other uses. Research suggests that energy can be conserved by two main methods thus technology fixed and behavioural approach. The technology fixed method is premised on the use of instruments such as motion sensor control lighting and photovoltaic while the behavioural approach is based on changes in the attitude of people using motivation, awareness creation and skills development (Wai et al, 2006). Explaining human behaviour is complex and requires a model to explain the nature of behaviours in specific context. The study therefore relied on the concepts on energy conservation, energy knowledge and energy Conservation behaviour, energy efficiency measures and behaviour change and Theory of Planned Behaviour (TPB) to assess the knowledge, attitude and practice of energy conservation among employees of the University for Development Studies.

1.2.1 Energy Conservation

Cleveland & Morris (2006) define energy conservation as “a collective term for activities that reduce end-use demand for energy by reducing the service demand”. Energy conservation allow us to cope with our scarce economic resources and postpone the reduction of our limited fossil resources on which our current energy supply mostly depends and finally is considered as one of the better alternatives for reducing carbon dioxide emissions (Linares & Labandeira, 2013).

According to Low et al. (2011), there are two ways that can be used to promote energy conservation which are structural energy conservation and non-structural energy conservation. The former relates to the application of technologies instrument, tools or alternatives energy resources and required capital investment. While the latter emphasizes on improving or changing the user energy behaviour to achieve energy reductions. One of the negative aspects of the structural energy conservation is it creates rebound effect especially when people tend to use the appliances more often when the appliance is labelled as energy efficient. According to Peattie and Peattie (2009), the improvement made by efficient appliances is always offset by the growth in frequency of utilizing the appliances and this will lead to higher energy consumption. As technology approach requires no behaviour changes, user could still waste energy in the same way (Choong, 2008). Besides, by installing expensive energy efficiency appliances or installation of insulation that will not be the final solution to overcome the energy sustainability issues (Low et al., 2011). Arguing along the same line Kempton and Schipper (1994) stated that “as we develop physical technologies to improve energy efficiencies, we only migrate the effects of energy

use by human, not curing the energy problem that we are facing”. Therefore, the best way in energy conservation is by focusing on behavioral aspects by improving or changing user’s energy conservation behaviour.

1.2.2 Knowledge and Energy Conservation Behaviour

According to Alba and Hutchinsan (1987), knowledge is a relevant and significant construct that affect how individual gather and organize information. Blackwell et al., (2001) defined knowledge as the information content concerning to someone’s memory which impact the method which users translate present selection which result to two kinds of knowledge which are subjective and objective. Subjective or general knowledge refer to knowledge of facts, concepts, and relationships concerning the natural environment and its major ecosystems (Fryxall & Lo, 2003), while objective or specific knowledge is refer to the perception or assessment of the individual on what they know about that issue (Brucks 1985). People’s level of awareness is affected by the knowledge they possess. Schmidt (2007) cited awareness as incorporating knowledge of contemporary issues affecting nature locally and beyond, discovering which actions can make a difference in your surrounding and self-awareness concerning personal environmental philosophies.

1.2.3 Energy Efficiency Measures and Behaviour Change

The current power crisis in Ghana coupled with the increases in electricity and water tariffs has led to most consumers adopting energy efficiency measures to reduce cost and save money. This section provides a short overview of the main factors influencing consumer behaviours and practices. Behavioural models are necessary to understand what consumers do, and why they do so. Such models tend to vary widely by theory, concepts and applications (Axsen and Kurani, 2012). A simplified model is presented in Figure 1 below.

One important message evident in Figure 1 is that relationships between various factors that influence behaviour and consumption practices and the human element are dynamic, and not static, as they are assumed to be in a large body of literature on this topic. They change over time, rendering consumer behaviour and the process of consumption practices development somewhat irrational and to some extent unpredictable.

Social science can improve our understanding of individual and societal responses to their surroundings; it has been used to investigate people's relationship with energy, energy use and energy efficiency behaviour change initiatives/measures. Recent social science research reveals some of the shortcomings of the work carried out in this field on consumer behaviour over the past decades.

For instance, Shove (2003) argues that there is evidence that routine consumption is controlled to a large extent by social norms, and is profoundly shaped by cultural and economic factors (see Figure 1). In her view, not only are habits changing, but they are doing so in a way that often leads to a standardisation of consumption patterns (via commercial interests, more often than not) conducive to an escalation of resource consumption and environmental degradation. In her work entitled ‘Converging Conventions of Comfort, Cleanliness and Convenience’, Shove challenges the conventional wisdom whereby adoption of more sustainable ways of life depends on the diffusion of 'green' beliefs and actions through society. She demonstrates that current consumption patterns,

particularly in energy and water, reflect that we are generally not aware of routines and habits.

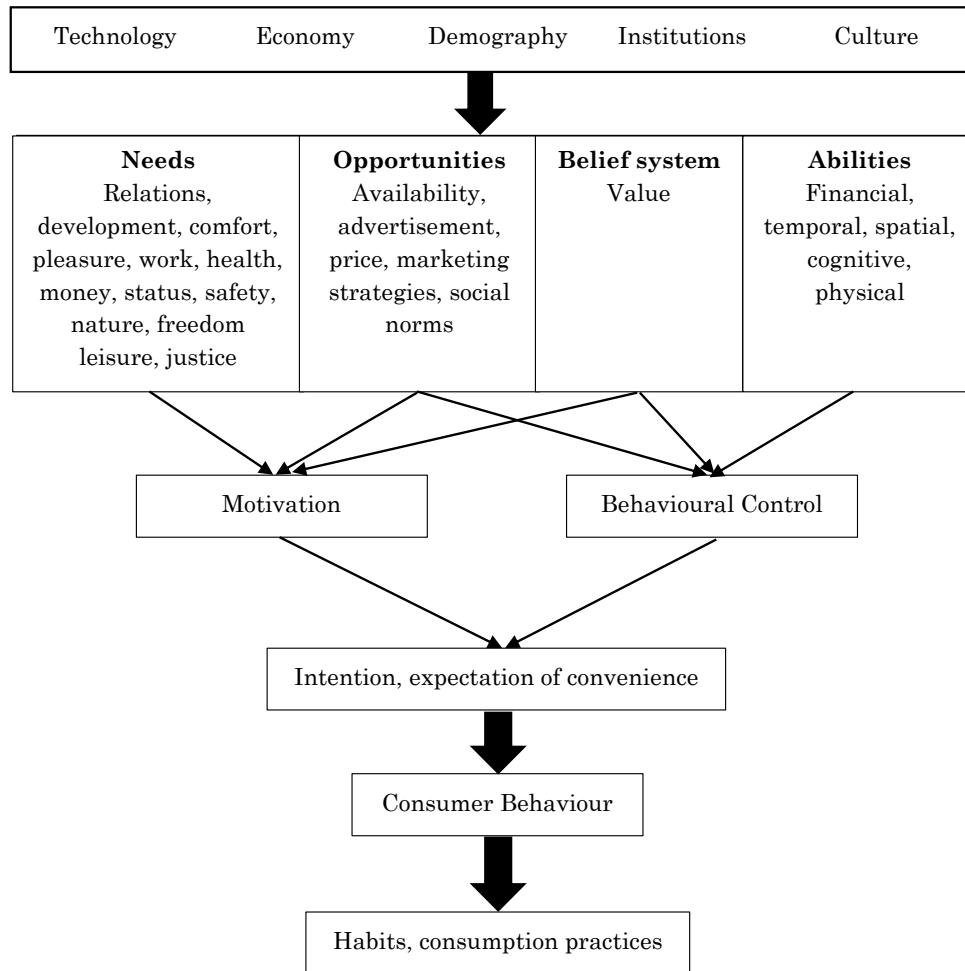


Fig. 1: Main Factors influencing Consumer Behaviour and Emergence of Consumption Practices

Source: Adapted from the European Environment Agency Technical Report No 5/2013

One of the main conclusions stemming from this research is that instead of keeping the focus on individual consumption one should rather concentrate on the emergence and transformation of collective conventions (social norms) as they are key in locking us into consumption patterns with different consequences for resource consumption and the environment.

Shove also argues that there is a close relationship between behaviours and infrastructure (Shove, 2010): energy infrastructure (e.g. smart grids, heating systems, roads and vehicles) plays a very active role in what people consider a normal way of life', according to her. While this is true, the interaction with new energy technologies is far from straightforward. The implications of these more recent findings in social sciences research for policymakers are significant. If one chooses to focus on consumption practices and how these become instilled in society instead of consumer behaviour exclusively (which mainly considers individuals), then a wider range of actors (including those identified in Figure1) should be engaged at the very start of the policy development cycle for energy efficiency. Given the complex interaction between consumers and new technologies, it also seems

necessary to gain a better understanding of which conditions most favour technology take-up.

1.2.4 Attitudes and Behaviour of Consumers

Attitudes are essentially learnt evaluations. They are judgements we make about saving energy and our assessment of the outcome of our (non)energy-saving behavioural choices. They enable us to accept or reject energy-saving arguments. Attitudes have been classically defined as evaluative statements-either favourable or unfavourable-concerning objects, people, or events. They reflect how one feels about something (Robbins, 2003). An attitude is a predisposition to make certain kinds of judgments about people, issues and events, usually in specific situations. Personal attitudes are a reflection of the broad values held by the individual. Attitudes lead to the development of personal opinions and prejudices, as well as contributing positively to an individual's exercise of judgment. Some attitudes are held firmly and are unlikely to be changed in a person's lifetime. Others are held less firmly, and are subject to change, where the individual perceives it useful to do so (Cole, 1996)

Within the context of saving energy, this can be mapped as:

Employees overall attitudes towards saving energy = their beliefs about the characteristics of energy saving initiatives (expectations) + their evaluation of those characteristics (e.g. good vs. bad)

Extensive research indicates that attitudes are reliable indicators of behavioural intention; hence they are very tangible and readily measurable variables in helping to explain why employees do and do not adopt energy saving behaviour in the workplace. However, as with all theories of human behaviour, it is not quite as simple as this, particularly if we reject the notion of mankind as little more than biological machine! In ideal conditions, there may well be a direct relationship between attitudes and behavioural intention. In most normal situations, however, there will be the mediating variables of subjective norm and/or perceived behavioural control. Hence people do not always behave in ways consistent with their attitudes. This attitude-behaviour gap has been explained by two prominent theories. The theory of reasoned action integrates subjective norm into the attitude-behaviour relationship. The theory of planned behaviour integrates both subjective norm and perceived behavioural control to explain the attitude-behaviour relationship. Both have been used successfully in a wide range of contexts to explain the presence or absence of a relationship between attitudes and behavioural intentions.

1.2.5 The Theory of Planned Behaviour

The theory of planned behaviour has been applied extensively to explain pro-environmental behaviour, for example recycling, energy consumption and water conservation as well as other types of behaviour. The theory predicts the occurrence of an actual behaviour, provided that behaviour is intentional and out lined the three variables which predict the intention to perform the behaviour (Ajzen, 1991). Besides, the theory has proven to be successful in explaining various type of environmental behaviour (Bamberg & Schmidt, 2003; Heath & Gifford, 2002). Literature on the Theory of Planned Behaviour revealed that it is one of the frequent models most frequently used to explore pro-environmental behaviour including energy consumption (Stern, 2000; Staats, 2003). In

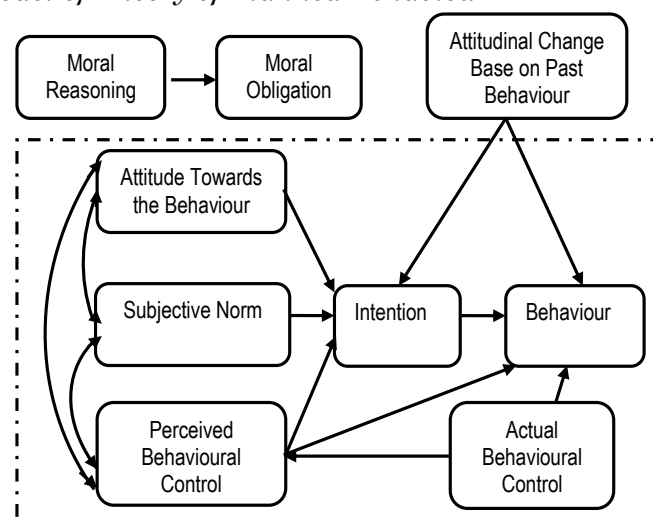
addition, researchers such as Egmond & Bruel (2007) mentioned that the theory is compatible in studying pro-environmental behaviour. The theory of planned behaviour also assumes that individuals may only have partial control. Consequently, the variable 'perceived behavioural control' was introduced as an additional indicator of behavioural intention and action (see figure 2).

The theory of planned behaviour (Ajzen 1991) suggests that behaviour results from the process of considering the time, financial, social and energy costs and benefits associated with any given behaviour. Behaviour is governed by a person's intention to perform it, and a person's behavioural intention is influenced by the following three factors: attitude- the individual's favourable or unfavourable evaluation of performing the behaviour; perceived control- the perceived ease or difficulty of engaging behaviour; and the subjective norm- the individual's perception of social pressure to perform or not to perform the behaviour (Ajzen 1991; Abrahamse & Steg 2009; Davis et al. 2009).

TPB postulates that behavioural intention is the main element to predict the actual behaviour which in turn is influenced by three independent variables namely attitude, subjective norm and perceived behavioural control (PBC). According to Niaura (2013), behavioural intention can be described as an intention of individual behaviour. Study by Ajzen et al. (2009) has found strong correlations between behavioural intention and actual behaviour. Study by Abrahamse & Steg (2011) reported that household energy conservation can be achieved through strengthening behavioural intention.

According to Ajzen (1991), individual attitude toward the behaviour refers to the degree to which a person has a favourable or unfavourable evaluation of the behaviour. For example, if a person belief that by reducing electricity consumption he or she contributes to the reduction of environmental pollution and conservation of natural resources, this can be stated that their personal attitude towards the performed behaviour is positive. Attitude effect behaviour due to influence by personal, social or informational factor. These factors help to evaluate behaviour whether positive or negative, surrender or resist social pressure, behave in one way or another. Thus, attitude has a direct influence on behavioural intention that helps to predict the behavioural of the energy user (Niaura, 2013).

Fig. 2: *Conceptual Model of Theory of Planned Behaviour*



Source: Icek Ajzen 2002

Chan (1998) states that subjective norm or social norm is the person's perception of the social pressures which is felt by him or her to involve or not to involve in with the behaviour. Subjective norm can also be comprehended as the perceived social force to carry out a particular behaviour (Ajzen, 1991). According to Ajzen (1991), subjective norm is the familiar opinion of others who are close and important to an individual and who maintain influence over decision making which affects an individual behaviour to perform or not to perform an action. Jager (2000) reports that individuals not only perform behaviour under social pressure but the subjective norm also provides them information about the appropriateness of the behaviour under consideration. Furthermore, subjective norm is important towards environmentally responsible behaviour and this is thoroughly documented in the literature. According to Bamberg *et al.* (2007) it is assumed that people frequently follow social norms not only because they fear social pressure but due to the information they perceive about what behaviour is most appropriate or beneficial. In energy consumption perspective, subjective norm is viewed as a belief as to whether energy conservation behaviour has to be implemented or not.

Given this theory and its application in various studies (e.g. Tonglet *et al.* 2004a; Davis *et al.* 2009), it appears that perceived behavioural control and attitudes are the leading determinants of pro-environmental behaviours and intentions (Abrahamse & Steg 2009). However, it has been argued that the inclusion of additional variables (e.g. moral norm, situational outcomes, concern for the environment and previous behaviour) may be necessary to accurately account for any variances in behavioural intentions (Tonglet *et al.* 2004b).

Perceived behavioural control (PBC) refers to an individuals' belief about how easy or difficult it will be to perform the behaviour. There is synergy here with the concept of self-efficacy – our evaluation of how well we can perform a behaviour to satisfy overall goals, such as saving energy, and the extent of our determination to see this through faced with difficulties. It is worth noting that these beliefs – whether expressed as PBC or self-efficacy - are learnt, typically from personal experiences and observing the behaviour of others. Hence, within the context of saving energy, individuals' successful engagement with this issue will depend on the strength of their belief that they can actually carry out the behaviour. Individuals who are more confident in this will be more successful in adopting energy saving behaviours than those who are not, and hence regard themselves as having limited volitional control. This highlights how important it is for the workplace to facilitate energy saving and other sustainability-orientated behaviours, for example a range of lighting options to enable employees to reduce lighting levels as well as to switch the lights off; and for the organisation itself to demonstrate, through example, its commitment to reducing energy conservation.

Based on the context of workplace energy efficiency, this theory suggests that an individual's energy saving behaviour is primarily determined by their attitude, the perceived difficulty of performing the behaviour and their concept of the social norm. An individual's willingness to perform easier measures, such as changing to energy efficient light globes, or drive to meet a perceived social norm by maintaining a cooled house during the heat season can be adequately described. Altering the behaviour of an individual, according to this theory, would involve addressing unfavourable attitudes, perceived difficulties associated with energy efficient actions and, perhaps most challengingly, the

individuals perception of the social norm. As this is ingrained in everyday social interaction, an organisation-wide approach would be required.

In conclusion there is a relationship between an individual's attitude and behavioural intention when they comply with the perceived expectations of significant others and where the individual feels they have sufficient volitional control.

RESEARCH METHODOLOGY

The University for Development Studies is a Multi-Campus Institution spread across the three regions of Northern Ghana. The University has Campuses in Tamale, Nyankpala, Navrongo and Wa. The research was conducted at the Central Administration, the main administrative seat of the University located in Tamale in the Northern Region. The participants were chosen from and among administrative staff. They included 6 junior staff, 37 senior staff and 7 senior members. The senior staff constitute the largest sample because they form the highest population at the Central Administration.

A descriptive research design was adopted to delve into the knowledge attitude and practice of staff in the University for Development Studies. According to Bhattacharjee (2012), descriptive research is aimed at careful observation and comprehensive documentation of a phenomenon of interest. It is further seeks to examine the what, where and when of a phenomenon of study.

Based on the research questions, the study adopted both qualitative and quantitative research approach. The qualitative research approach is an inquiry primarily based on the constructivist knowledge claims of the subjective perspectives of respondents. Thus, the multiple meanings that individuals ascribe to a phenomenon of study are premised on their experiences as well as the socio-historic context in which they live. In using this approach, the inquirer collects open-ended and emerging data. The primary intent of the researcher is to develop themes from the data collected (Creswell, 2003). The quantitative analytical approach also allows the reporting of summary results in numerical terms to be given with a specified degree of confidence. Quantitative analysis approaches are particularly helpful when the qualitative information has been collected in some structured way, even if the actual information has been elicited through participatory discussions and approaches (Abeyasekera and Lawson-McDowall, 2000).

The purposive sampling method was used. It is a sampling technique that is based on the researcher's use of his or her special knowledge or expertise in the selection of participants for inclusion in a research. This is to ensure that individuals with certain attributes are included in the study. Purposive samples are often used when the goal of the research is to describe a situation rather than generalization (Glassner et al., 1983, cited in Berg, 2001:32). The participants for the research were purposely selected among staff of the Central Administration of the University for Development Studies.

There can rarely be a research without recourse to data. Therefore, data is the blood life of every research work. In this regard, there were two main sources of data for this research work: secondary and primary sources. The secondary sources of data were obtained from documented literature or materials with particular reference to the subject matter of the paper. The research made use of books, published articles, reports as well as

news papers relevant to the study. The primary sources are first hand data obtained from the field. Therefore, relevant data was collected using some research instruments such as questionnaires and interview guides.

The data was analysed both qualitatively and quantitatively. The qualitative analysis simply involves the analysis of non-numeric (qualitative) data from interviews and transcripts while quantitative analysis involves statistical analysis of the data collected and hypothesis testing. Qualitative analysis of data to a large extent depends on the analytic and integrative skills of the researcher as well as the personal knowledge of the geographic and social context in which the data was collected. The emphasis in qualitative data analysis is on “sense making” or alternatively understanding the phenomena of interest in the social setting of the study (Bhattacharjee, 2012).

Based on the objectives of the research, qualitative data analysis was employed except a partial correlation which was tested to ascertain the relation between category of staff, gender, length of service in the university and number of hours spent in office on daily basis. To proceed with the analysis, there was data cleaning as the first step. At this stage, the data collected was edited to deal with all errors and uncompleted statements in the course of filling the interview schedule. The researcher read through the descriptive statements of the respondents in order to identify patterns of responses. This formed the basis for categorization and the derivation of themes with due cognizance of the pattern of responses by the respondents of the study. The researchers then assigned codes to the themes based on their commonalities and similarities. This was subsequently followed by quantification and classification of responses into the various themes that have been identified. Further interpretation of the data was given based on the themes to expatiate on the subject matter of the study.

RESULTS AND DISCUSSION

The study found out whether there was a relation between making any conscious efforts to putting off energy source after close of work and category of staff, gender, length of service in the university and number of hours spent in office on daily basis. A partial correlation analysis was tested with a p value < 0.05 . The analysis between these variables confirms that between all the variables except gender at $p < 0.05$ or better suggests there is a significant relationship between category of staff, length of service in the university and number of hours spent in office and making conscious efforts of putting off electrical appliances off after office hours as shown in Table 1. The results imply that, gender has nothing to do with their efforts to conserving energy at the workplace.

Table 1: *Partial Correlation Analysis*

Control Variables			Category of Staff	Gender	Length of Service in University	Number of hours spent in office
Any	Category	Correlation	1.000	-.071	.048	.240

conscious effort to put electrical appliances off after office hours?	of Staff	Significance (1-tailed)	.	.313	.371	.048
		df	0	47	47	47
	Gender	Correlation	-.071	1.000	.403	-.229
		Significance (1-tailed)	.313	.	.002	.056
		df	47	0	47	47
	Length of Service in University	Correlation	.048	.403	1.000	.016
		Significance (1-tailed)	.371	.002	.	.457
		df	47	47	0	47
	Number of hours spent in office	Correlation	.240	-.229	.016	1.000
		Significance (1-tailed)	.048	.056	.457	.
		df	47	47	47	0

Source: *Field work, 2015*

In a similar study, Farhar et al., (1979) speculates that home-related energy conservation in heating and appliance use may threaten the traditional role of the woman in providing family comfort. However, several studies show women are more favourable toward energy conservation in the home than men (Opinion Research Corporation, 1975b, 1976a; Cunningham and Lopreato, 1977). Bartel, (1999) however, find no differences in gender attitudes. This supports the findings of this study but fails to uncover consistent relationships between energy conservation and a potential predictor variable.

3.1 Knowledge on the Effective Use of Workplace Energy

It is pertinent to contend that, attempts at addressing energy efficiency practice in the workplaces should focus on employees' understanding of the level of perception/awareness on energy efficiency in consideration of such factors that are appropriate for policy formulation and implementation. This is because, policies are essential for ensuring the effectiveness of efforts to change individual, workplace and organizational behaviour. Table 2 reveals that 80% of the respondents have a fair knowledge of energy conservation, 96% are aware that switching off electrical appliances from power source when not in use saves energy and 92% are also aware that putting switches off when not in use save energy. In terms of putting in place a custom for switching off lights in office when leaving the office as the last person, 90% of the respondents indicated that there was no laid down policy/custom but explained that it was only prudent as rationale beings to switch off lights after working hours. In line with this Ehrhardt-Martinez (2008) maintains that effective policies embody the potential of removing structural, institutional and legal barriers to behavioural change.

Table 2: *Knowledge of Effective use of Energy*

S/N	Item	Yes	%	No	%	Total (N=50)	Total %
1	Have you ever heard about Energy Conservation in your office?	40	80	10	20	50	100
2	Are you aware that switching off electrical appliances from power source when not in use saves energy?	48	96	2	4	50	100
3	Are you aware that putting switches off when not in use save energy?	46	92	4	8	50	100
4	Is there a custom to put off lights in office when leaving the room as the last person?	45	90	4	8	49	98
5	Any conscious effort of putting electrical appliances off after office hours?	40	80	7	14	47	94
6	Does opening and closing of refrigerator doors saves energy?	39	78	10	20	49	98
7	Do you know that refrigerator door seals should be air tight?	40	80	9	18	49	98
8	Is someone in your office responsible for defrosting your freezer?	8	16	15	30	23	46
9	When the computers are not being used, do you make any changes in their power or hibernation setting?	22	44	27	54	49	98
10	Would sharing equipment help conserve energy?	20	40	18	36	38	76

Source: *Field work, 2015*

A follow-up question to find out whether respondents were aware that opening and closing refrigerators immediately and providing tight seals saves energy, 78% and 80% respectively responded in the affirmative. The questionnaire also sought to find out whether someone was made responsible for switching off energy sources on daily basis, respondents were emphatic that no one was tasked with the responsibility. Most of the employees were not also aware that putting computers on hibernation and sharing equipment reduces energy consumption.

In consonance with these findings, Wai et al, (2006) opines that energy is wasted each day due to actions and inaction of the society and the principal cause is lack of awareness among societies. In the same vein, Gardner and Stern (2000) asserts that from a behavioural perspective it is much easier to change a singular investment decision than to change daily behaviour such as switching off lights after leaving a room. They are of the opinion that while energy savings resulting from technology adoption tend to have long run effects, behavioural measures may only have transitory effects (Abrahamse et al. 2005). Barr, Gilg and Ford (2005) also distinguish explicitly between habitual behaviour and technology adoption and stress that energy savings behaviour needs to be considered within the broader context of environmental behaviour.

3.2 Attitude of Staff towards Energy Usage

The questionnaire protocol solicited information from respondents on their general attitude towards energy conservation as well as the use of energy efficient equipment in the offices. It was clear that university administrative personnel generally have a favourable view about energy conservation efforts although they acknowledge difficulties in realizing energy conservation in their offices.

Table 3: *Attitude of Staff towards Energy Usage*

S/N	Item	Yes	%	No	%	Total (N=50)	Total %
1	Is energy conservation something that is important to you and your office?	46	92	3	6	49	98
2	Have you instituted any conservation measures in your office?	38	76	12	24	50	100
3	Do you switch off lights and other electrical appliances when not in use?	43	86	7	14	50	100
4	Do you insist on star rated electrical appliances while buying them for office?	13	26	23	46	36	72

Source: *Field work, 2015*

Table 3 provides a numerical evidence of the responses solicited from respondents. Many respondents revealed some prior consideration of energy conservation in their offices and have the view that it would be a good practice to try and implement energy conservation. Despite an apparent favourable attitude towards the idea of energy conservation, it seems that energy conservation practices are generally not a priority among administrative staff of the university. With reference to their insistence on purchasing star-rated appliances, participants indicated that they were not part of the procurement committee and so have no opportunity to advice on the type of electrical appliances to buy.

In support of this assertion, Peattie and Peattie (2009), argues that the improvement made by efficient appliances is always offset by the growth in frequency of utilizing the appliances and this will lead to higher energy consumption. This implies that technology approaches may not require behaviour changes; however, failure of behaviour change by the consumer could still waste energy in the same way (Choong, 2008). Besides, by installing expensive energy efficiency appliances or installation of insulation that will not be the final solution to overcome the energy sustainability issues (Low et al., 2011). Arguing along the same line Kempton and Schipper (1994) stated that “as we develop physical technologies to improve energy efficiencies, we only migrate the effects of energy use by human, not curing the energy problem that we are facing”. Therefore, the best way in energy conservation is by focusing on behavioural aspects by improving or changing user’s energy conservation behaviour

3.3 Benefits in Prioritizing Energy Efficiency in the Office

Respondents offered specific examples of the benefits of conserving energy. Some of the benefits offered included: conservation energy to save the university cost to reserve

money for development; prevent fire outbreaks as a result of electrical faults; prolong the life span of electrical appliances to increase productivity; save electrical appliances from damaging; reduce electrical bills as per the departmental allocations; improve work efficiency; reduce cost of running the offices due to increased efficiency; increase work efficiency when energy efficient appliances are used; ensure the maintenance of safety regulations for life and property; improve safety in office; ensure electrical equipment are not over used; minimize the breakdown of appliances; reduce pressures on the transformers, protect appliances from electricity failure (low/high current). To buttress these laudable ideas Bawakyillenuo and Agbelie, (2015) posits that the realisation has underpinned several research works in the field of energy and the environment in order to address socio-economic issues including, poverty, income disparity, energy availability, accessibility and affordability in urban and rural areas. They emphasized that energy undoubtedly has been recognized as an indispensable resource for the promotion of economic activities and the enhancement of human welfare. They opined that effective energy conservation and efficiency solutions will likely draw on a better understanding of the social systems and human behaviours that shape energy consumption.

3.4 Challenges in Prioritizing Energy Efficiency in the Office

Responses from the questionnaire revealed that not all staff are involved in the procurement processes hence, their inability to contribute to the purchasing of efficient electrical appliances. Apart from that individual staff do not have control over the type of appliance purchased for use in the various offices because purchases of office equipment is left to the discretion of the procurement committee or scheduled officers in the procurement office. It is in line with this that Wai et al, (2006) contend that energy is wasted each day due to actions and inaction of the employees. He emphasized that the principal cause of energy wasted is lack of involvement and awareness among employees. The failure to adopt participatory management strategies at the university makes it extremely difficult to change people's behaviour and attitudes towards energy conservation. In view of this setback individual interest supersedes the collective interest of the university in terms adopting energy efficient strategies and principles. For instance whereas some staff would want to be on their emails throughout the day, others would enjoy perusing through all sites of the internet without due cognizance to the cost involved.

Respondents also stated that certain economic barriers or disincentives to increased energy conservation in offices, especially in the area of the purchase and use of energy efficient equipment points to budgetary constraints as a chief barrier to adopting energy conservation practices in their offices. This was highlighted when respondents turned to a discussion of possible purchase of energy efficient equipment. Repeatedly, respondents explained that, their limited budgets coupled with the lack of involvement in the procurement processes compel them to purchase equipment with the lowest purchase price regardless of the equipment's energy consumption rating. Furthermore, there was widespread concern voiced by respondents that current equipment cannot be easily replaced with more energy efficient equipment because of budgetary constraints. As one puts it, there is just not enough money in academia, so there has to be a balance between energy conservation and money wasting." This assertion is supported by studies conducted by Grier (1976) and Talarzyk and Omura (1974). Their studies revealed that there exists a

relationship between economic barriers and energy conservation. They are of the view that income-related influences on conservation or non-conservation of energy. Based on general indices or questions about energy conservation behaviour their studies have found positive associations between energy conservation and income and between energy conservation and social class (Bultena, 1976). Their studies concluded that institutions and individual with higher incomes are likely to purchase higher efficient energy conservation equipment while those with budgetary constraints purchase equipment without due recourse to their energy efficiency. Hogan (1976) has a similar view and concluded that there was a significant relationship between energy conservation and income.

Faulty switches of air conditioners, which make it difficult to turn them off, lack of replacement of outmoded electrical equipment increases the time for rebooting computers and cooling down systems which eventually lead to high consumption rates, were some other responses. To buttress this point, Hugo and Andréa (2015) opine that the life cycle of many electronic goods have been substantially shortened due to advancements in electronics, attractive consumer designs, marketing and compatibility issues. For example, the average life cycle of a new computer has decreased from 4.5 years in 1992 to an estimated 2 years in 2005 and is further decreasing yet some of the computers used in the offices today are more than five years old.

An emerging trend that emanates from constantly reminding colleague employees to observe energy conservation measures in the office most times lead to personal problems as some of them take things very personal. However, behaviour change has the potential to reduce energy consumption yet possesses just a fraction of the costs of technological change. Dietz et al. (2009) offer evidence that behaviour change measures can on their own lead to substantial reductions in energy use. Nguyen & Aiello (2013) in their opinion suggest that careless energy consumption in office buildings “can add one-third to a building’s designed energy performance, while conservation behaviour can save an additional third” (p. 245). Hence, energy unaware behaviour “uses twice as much energy as the minimum that can be achieved” (Nguyen & Aiello, 2013:p.246). Behavioural interventions may also have a positive spillover effect related to energy efficient technologies. For example the behaviour of individuals “can strengthen or undermine the effectiveness of technical measures which have been implemented with energy conservation and efficiency considerations in mind” (Lo et al, 2012 a: p. 227-228). In a similar vein, Stern et al. (1995) puts it that the adequacy of energy conservation knowledge alone as a catalyst for change has been questioned. They highlighted the role of socio-psychological factors such as values, social norms, altruism, beliefs and attitudes in influencing energy conservation behaviour. Values and attitudes are often conceived as guiding principles that direct the attention of individuals towards value-congruent information that may affect behaviour.

CONCLUSION

The study found no differences in gender attitudes and making conscious efforts of putting off electrical appliances off after office hours but failed to uncover consistent relationships between energy conservation and a potential predictor variable. It further revealed that more than 80% of the respondents are aware of the behaviour change

strategies for conservation but some of them have not made it part of their daily routine and habits', viz., putting off lights even when not required and computers on standby mode are certain complicated behaviours which are difficult to change and this significantly affects employee relations though conservation behaviours are significantly related to beliefs in material growth and comfort associated with it.

The study also found that many respondents considered prior energy conservation strategies in their offices and have the view that it would be a good practice to try and implement energy conservation. Despite an apparent favourable attitude towards the idea of energy conservation, it seems that energy conservation practices are generally not a priority among administrative staff of the university. Respondents identified the following as the benefits of energy conservation: conservation saves the university cost to reserve money for development; prevent fire outbreaks as a result of electrical faults; prolong the life span of electrical appliances to increases productivity; increases work efficiency when energy efficient appliances are used; ensures the maintenance of safety regulations for life and property; improves safety in office; ensures electrical equipment are not over used; minimizes the breakdown of appliances; reduces pressures on the transformers, protect appliances from electricity failure (low/high current) and University and country at large will save energy the money for development.

The study concluded that energy is wasted each day due to actions and inaction of the employees. It emphasized that the principal cause of energy wasted is lack of involvement and awareness among employees. The failure to adopt participatory management strategies at the university makes it extremely difficult to change people's behaviour and attitudes towards energy conservation. In view of this setback individual interest supersedes the collective interest of the university in terms adopting energy efficient strategies and principles.

RECOMMENDATIONS

The only way to combat ignorance is through education therefore, the idea of energy saving should be promoted throughout all structures of the university, organize training programmes, personal advice, one-to-one engagement, demonstrations, benchmarking, commitment, goal-setting, labelling, prompts, modeling and feedback on energy conservation strategies periodically to refresh employees energy conservation behaviour. Aside that, promotional campaigns should be developed which takes into consideration specific behaviours associated to energy consumption. Also, incentives and disincentives policies for energy conservation should be framed when considering how people's behaviours are formed and how they could be influenced.

Energy audit is an effective instrument in advancing energy efficiency in the university. Energy audits should be considered as part of directives on energy performance of buildings in connection to the issuance of building permits. Management of the university needs to promote energy audit activities on all the Campuses of the university and also make energy audits mandatory and provide feedback to employees in the various offices. Energy audits will provide detailed information on energy use and saving potential. An energy audit would normally include an evaluation of the thermal characteristics of the building, its existing infrastructure and the appliances in use. Even though an energy audit

reports may not directly address behaviour change. Typically, energy audits tend to focus more on measures that require investment in a specific technology. However, a successful measure in raising awareness about energy issues is a prerequisite for changing behaviour and consumption practice. To strengthen the link between energy audits and consumption practices, energy audits should be part of a longer-term programme to improve energy management and not just a one-off activity. Social norms should include groups sharing information to facilitate behaviour change.

Institutional-based initiatives, should be adopted by increasing a number of interactive programmes which are geared towards pro-environmental behaviour change. These types of initiatives appear to be most effective when they are part of a more comprehensive programme that includes feedback measures and/or aims to implement technological interventions at the workplace. Primarily targeted at employee, reinforce positive change in social norms regarding environmental/energy efficiency behaviour and allow sharing of good practice. The fact that employees are already acquainted may have a positive influence on establishing these social norms. Institutional based initiatives have the potential to establish ownership and responsibility for actions to improve environmental footprint/energy efficiency, even in situations where individuals may otherwise feel that their contribution is insignificant. In other words, it is important that information on the individual impact on the university delivering the services targeted by the programme (be it the energy utility, the water company, etc.) is clearly communicated.

Behaviour change strategies are more likely to be successful and it will make the tasks and responsibilities confronting university management easier if, like the assumption of behavioural insights, they go with the grain and address the conditions that drive people's behaviour as well as the behaviours themselves. If behaviours are to change, then the conditions should be created which encourage and enable people to change.

Employees should be encouraged to turn off lights when out of the office for long periods of time, in infrequently used periods such as break time, or lights that are not necessary for the task being performed; turn off office equipment including computers and monitors-when they're not in use and utilize all available energy savings features on equipment and eliminate unnecessary power supply by unplugging less frequently used equipment with remote controls such as projectors as they continue to use power when turned off. They should also make optimal use of air conditioning! Don't prop doors open and keep areas clear that would block or hamper air circulation

REFERENCES

- [1] Abeyasekera, S. & Lawson-McDowall, J. (2000). Computerising and analysing qualitative information from a study concerning activity diaries. Case-Study paper for DFID project on Integrating qualitative and quantitative approaches in socio-economic survey work". Available at www.reading.ac.uk/ssc/.
- [2] Abrahamse, W., & Steg, L. (2011). Factors related to household energy use and intention to reduce it: the role of psychological and socio-demographic variables. *Hum. Ecol. Rev.* 18, 30–40.

- [3] Abrahamse, W. & Steg, L. (2009). How do Socio-demographic and psychological factors relate to households, direct and indirect energy use and savings? *Journal of Economic Psychology*, 30(5), 711-720. [Doi:10.1016/j.joep.2009.0.006](https://doi.org/10.1016/j.joep.2009.0.006).
- [4] Abrahamse, W., Steg, L., Vlek, C. & Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. *J. Environ. Psychol.* 25, 273–291. [doi:10.1016/j.jenvp.2005.08.002](https://doi.org/10.1016/j.jenvp.2005.08.002).
- [5] Alba, J.W. & Hutchinson, J.W. (1987). Dimensions of consumer expertise. *Journal of Consumer Research*, 13(3), 411- 454.
- [6] Ajzen, I., Czasch, C. & Flood, M. G. (2009). From Intentions to Behavior: Implementation Intention, Commitment, and Conscientiousness. *Journal of Applied Social Psychology*. 39 (6), p. 1356–1372. <http://dx.doi.org/10.1111/j.1559-1816.2009.00485.x>.
- [7] Ajzen, I. (2002). Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior¹. *Journal of Applied Social Psychology*, 32(4), 665–683. [doi:10.1111/j.1559-1816.2002.tb00236.x](https://doi.org/10.1111/j.1559-1816.2002.tb00236.x).
- [8] Ajzen, I. (1991). The Theory of Planned Behaviour. *Organizational Behavior and Human Decision Processes*, 50, 179–211
- [9] Arko, C. (2013). Energy Conservation, Key to a sustainable power use in Ghana. Ghana News Agency accessed on 30th June 2014 at <http://www.ghananewsagency.org/features/energy-conservation-key-to-sustainable-power-use-in-ghana--59523>.
- [10] Axsen, J. & Kurani, K.S. (2012). Social influence, consumer behavior and low-carbon energy transitions, *Annual Review of Environment and Resources*, 37, 311-340.
- [11] Bamberg, S., Hunecke, M. & Blohbaum (2007). Social context, morality, and the use of public transportation: Results from two field studies. *Journal of Environmental Psychology* 27, 190–203. Blackwell R.D., Miniard, P.W., & Engel, J.F. (2001). *Consumer Behaviour*. (9 ed.). New York: Harcourt College Publishers.
- [12] Bamberg, S., Ajzen, I. & Schmidt, P. (2003). Choice of travel mode in the theory of planned behavior: the roles of past behavior, habit, and reasoned action. *Basic Appl. Soc. Psych.* 25, 175–187. [doi:10.1207/S15324834BASP2503_01](https://doi.org/10.1207/S15324834BASP2503_01).
- [13] Bartel-Sheehan, K. (1999). An investigation of gender differences in on-line privacy concerns and resultant behaviors. *J Interact Mark*;13(4):24.
- [14] Barr, S., Gilg, A. & Shaw, G. (2005). Promoting Sustainable Lifestyles: A Social Marketing Approach – Technical Paper. Stewart Barr et al at the University of Exeter for Defra CAD.
- [15] Bawakyillenuo, S. and Agbelie, I. (2015). The Nexus between Urbanisation and Energy in Ghana: A Literature Review: <http://samsetproject.site11.com/wp-content/uploads/2014/03/The-Nexus-between-Urbanisation-and-Energy-in-Ghana-A-Literature-Review-University-of-Ghana.pdf>.
- [16] Berg, L. B (2001) *Qualitative Research Methods for the Social Sciences*. 4th Edition: Allyn & Bacon at www.abacon.com
- [17] Bhattacharjee, A. (2012). "Social Science Research: Principles, Methods, and Practices". Textbooks Collection. Book 3. http://scholarcommons.usf.edu/oa_textbooks/3.
- [18] Bultena, Gordon L. (1976), *Public Response to the Energy Crisis: A Study of Citizens' Attitudes and Adaptive Behaviors*, (Ames, Iowa: Iowa State University).

- [19] Chan, K. (1998). Mass communication and pro-environmental behaviour: waste recycling in HongKong. *Journal Environmental Management* 52(4):317–25.
- [20] Choong, W. W. (2008). Conceptual Model of Energy Awareness Development Process. Doctor of Philosophy, Universiti Teknologi Malaysia.
- [21] Cleveland, C. J., & Morris, C. G. (2006). *Dictionary of energy*. Amsterdam; London: Elsevier
- [22] Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: The Belknap Press.
- [23] Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed method approaches I* by John W. Creswell.- 2nd ed. p.cm Sage Publications, Inc. Includes bibliographical references and indexes. ISBN 0-7619-2441-8 (c) - ISBN 0-7619-2442-6 (pbk.).
- [24] Cunningham, W. R. & Lopreato, S. C. (1977), *Energy Use and Conservation Incentives*, (New York: Praeger Publishers).
- [25] Daily Guide (31st October, 2013). Parents to pay light bill in SHS at www.dailyguide.org accessed on 5th July, 2014.
- [26] Davis, L., Loyo, K., Glowka, A., Schwertfeger, R., Danielson, L., Brea, C., Easton, A., & Griffin-Blake, S. (2009). A comprehensive worksite wellness program in Austin, Texas: Partnership between steps to a healthier Austin and Capital Metropolitan Transportation Authority. *Preventing Chronic Disease*, 6(2), A60.
- [27] Dietz, T., Gardner, G., Gilligan, J., Stern, P. & Vandenberg, M. (2009). Household actions can provide a behavioural wedge to rapidly reduce US carbon emissions. *Proceedings of the National Academy of Sciences of the United States of America*. 106 (44), 18452.
- [28] Egmond, C., & Bruel, R. (2007). Nothing is as practical as a good theory, analysis of theories and a tool for developing intervention to influence energy –related behaviour.
- [29] Ehrhardt-Martinez, K. (2008). “Behaviour, Energy, and Climate Change: Policy Directions, Program Innovations and Research Path.”. Report Number E087, November, 2008. American Council for an Energy-Efficient Economy (ACEEE) @ <http://aceee.org>. Accessed 15/04/2010.
- [30] Farhar, B. C., Wells, P., Unseld, C. T. & Burns, B. A. (1979), *Public Opinion About Energy: A Literature Review*, (Golden, Colorado: Solar Energy Research Institute).
- [31] Fryxall, G. & Lo, C. (2003). The influence on environmental knowledge and values on managerial behaviours on behalf of the environment: An empirical examination of managers in China. *Journal of Business Ethics*, 46, 45-59.
- [32] Grier, E. S. (1976), "Changing Patterns of Energy Consumption and Costs in U.S. Households," presented at Allied Social Science Association Meeting, (Atlantic City).
- [33] Gunatilake, H. & Padmakanthi, D. (2008). *Economics of Energy Conservation: A Case Study*. ADB Economics Working Paper Series No. 131
- [34] Heath, Y. & Gifford, R. (2002). Extending the theory of planned behavior; Predicting the use of public transportation. *Journal of Applied Social Psychology*, 32, 2154-2185.
- [35] Hogan, J. M. (1976). *Energy Conservation: Family Values, Household Practices, and Contextual Variables*, Ph.D. dissertation, East Lansing: Michigan State University).

- [36] Hugo, M. V. & Andréa, M. B. (2015). *Electronic Waste: Generation and Management*. Springer International Publishing Switzerland 2015; Metallurgy and Materials Engineering, [DOI 10.1007/978-3-319-15714-6_2](https://doi.org/10.1007/978-3-319-15714-6_2).
- [37] Jager, W. (2000). *Modelling consumer behavior*. University of Groningen, Groningen
- [38] Kempton, W. & Schipper, L. (1994). *Expanding the Human Dimensions Research Agenda*. Proceedings of the ACEE 1944 Summer Study on Energy Efficiency in Buildings. American Council for an Energy-Efficient Economy.
- [39] Linares, P. and Labandeira, X. (2013). *Renewable electricity support in Spain: A natural policy experiment*. Working paper, 4/2013. Economics for Energy.
- [40] Lo, S., Peters, G. & Kok, G. (2012a) A Review of Determinants of and Interventions for Pro-environmental Behaviours in Organizations. *Journal of Applied Social Psychology*. 42 (12), 2933.
- [41] Low, S. T., Abdul, H. & Choong W. W. (2011). *Promoting energy conservation behavior: A plausible solution to energy sustainability threat*. International Conference on Social Science and Humanity, Singapore.
- [42] Lutzenhiser, L. (1993). Social and behavioral aspect of energy use. *Annual Review of Environmental Resource* 18, 247–289.
- [43] Mills, B. & Schleicha, J. (2012) Residential Energy-Efficient Technology adoption, Energy Conservation, Knowledge, and Attitudes: An Analysis for European Countries. <http://www.sciencedirect.com/science/article/pii/S0301421512005897>
- [44] Nguyen, T. & Aiello, M. (2013) Energy intelligent buildings based on user activity: A survey. *Energy and Buildings*. 56, 244.
- [45] Niaura, A. (2013). Using the Theory of Planned Behavior to investigate the determinants of environmental behavior among youth. *Environmental Research, Engineering and Management*, 1(63), 74-81.
- [46] Peattie, K., & Peattie, S. (2009). Social Marketing: A Pathway to Consumption Reduction?. *Journal of Business Research*, 62, 260-268.
- [47] Opinion Research Corporation (1976a), *Private Individual's Willingness to Make Energy-Saving Efforts and Their Perceptions of Others Doing the Same*, Technical Information Service No. 255 946.
- [48] Opinion Research Corporation (1975b), *Consumer Behavior and Attitudes Toward Energy-ReLated Issues*, Technical Information Service No. 244 986
- [49] Robbins, S. P. (2003). *Organisational behaviour: global and Southern African perspectives*. Cape Town, Pearson Education South Africa
- [50] Samoteeva, O. (2000). *Energy Conservation in Moldova – Opportunities in the Industrial & Residential Sectors*. <http://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-78828>
- [51] Schmidt E. J. (2007). From intention to action: The role of environmental awareness on college student. *Journal of Undergraduate Research*.
- [52] Shove, E. (2003). 'Converging conventions of comfort, cleanliness and convenience.' In: *Journal of Consumer Policy*, Vol. 26, No. 4, 12.2003, p. 395–418.
- [53] Staats, H. (2003). *Understanding Pro-environmental Attitudes and Behaviour: an analysis and review of research based on the theory of Planned Behaviour*, Bonnes, M., T. Lee, M. Bonaiuto (eds) *Psychological Theories for Environmental Issues*. Aldershot: Ashgate Publishing.

- [54] Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *J. Soc. Issues* 56, 407–424. [doi:10.1111/0022-4537.00175](https://doi.org/10.1111/0022-4537.00175).
- [55] Stern, P. C., Dietz, T., Kalof, L. & Guagnano, G.A., (1995). Values, beliefs and pro-environmental action: attitude formation towards emergent attitude objects. *Journal of Applied Social Psychology* 25 (18), 1611–1636.
- [56] TaLarzyk, W. W. & Omura, G. S. (1974). "Consumer Attitudes Toward and Perceptions of the Energy Crisis," in 1974 Combined Proceedings, ed. Ronald C. Cruham, (Chicago: American Marketing Association, 316-322.
- [57] Tonglet M., Phillips, P. S. & Bates, M. P. (2004a). Determining the drivers for householder pro-environmental behaviour: Waste minimisation compared to recycling. *Resources, Conservation and Recycling* 42: 27-48.
- [58] Tonglet M., Phillips P. S. and Read, A. D. (2004b). Using the theory of planned behaviour to investigate the determinants of recycling behaviour: A case study from brixworth, UK. *Resources, Conservation and Recycling* 41:191-214.
- [59] Wai, C. W., Mohammed, A. H. & Alias, B. (2006) Energy Conservation: A Conceptual Framework of Energy Awareness Development Process. *Malaysian Journal of Real Estate*, 1 (1). pp. 58-67. ISSN 1823-8505 at <http://eprints.utm.my/544/1/58-67.pdf>.